INTRODUCTION

To function effectively as nurses in this evolving, complex healthcare system, nursing students must learn to be skilled thinkers, know how to learn, and know how to use what they know in novel situations. Rote memorization of facts and reliance on faculty to prescribe theoretical information and to dictate how to apply nursing theory to practice no longer serves as adequate preparation for professional nursing. Instead, nursing students must apply cognitive and metacognitive strategies to elucidate multifaceted solutions to complex problems. Research in the field of metacognition may offer a useful framework to improve learning and to enhance critical thinking and clinical decision-making in nursing students **(Benner et al., 2010).**

Cognitive skills such as problem solving and critical thinking are commonly highlighted in nursing curricula and research **(Omidi & Sridhar, 2012**). Nursing school requires not only high-level content knowledge, but also application of that knowledge in complex situations. For this reason, nursing students need to develop new strategies as they think about their learning. Second, metacognitive training may provide a basis for enhanced critical thinking and clinical decision-making throughout nursing school and nursing practice. The students who entering nursing schools are products of a lecture-driven education system in which memorization and regurgitation of information on exams are markers of success. They sit in class passively and listen to a teacher tell them what is deemed important. In nursing, this type of classroom environment will not provide students with the opportunity to apply concepts in novel situations **(Benner et al., 2010)**.

To capitalize on class time, students must prepare for class by reading, watching videos, and using other means to become familiar with the content. They must become responsible for their own learning and begin to take ownership of their education. A significant challenge is that a student’s typical method of learning may no longer be adequate. Unfortunately, many nursing faculty expect students to be self-directed and to arrive in nursing school with effective cognitive and metacognitive skills that will make them successful in preparing for class and in applying theory in practice. Many students have difficulty with class preparation and with having to navigate through content and, therefore, the instructor may perceived them as unmotivated or lazy when, in fact, they require a new way of thinking about how they are learning **(Bronwyn Perry Doyle, 2013).**

Nursing educators can use existing literature on metacognition to create sound pedagogical approaches to help students learn metacognitive strategies. Simply telling students to use metacognitive strategies will not be sufficient. Instead, purposeful development of these advanced thinking and learning skills may help students thrive both in nursing school and in the practice of nursing. If students are to be successful in nursing school, the responsibility falls on nursing faculty to create opportunities for students to think about how they are learning using the best available research (**Burton and Hope, 2018)**

Because of the aforementioned changes in the healthcare system and expectations for new nurses, nurse educators must incorporate new strategies to prepare their students both to learn and to practice nursing. Promising research in the field of metacognition offers a potential solution to fill the gap in instructional emphasis on thinking about learning in nursing education. Metacognitive research suggests that explicitly teaching metacognitive skills can increase metacognitive awareness and improve learning outcomes **(Bransford, Brown, & Cocking, 2000; Pate & Miller, 2001; Winne & Hadwin, 1998; Tanner, 2012).**

Nursing students require to gain knowledge, skills and attitudinal behaviors in order to prepare them for clinical practice. In the traditional method of nursing education, nursing students complete their education with real patients and this situation increases the risk of making mistakes towards patients **(Eyikara and Baykara, 2018)**. In higher education (HE), the majority of learning takes place outside of formal teaching sessions, and there is an emphasis on independent learning **(Hockingset al., 2018)**. Consequently, HE students must take responsibility for their learning, not only in terms of time and resource management, but also in terms of how they learn. Students who enter HE from the highly supportive school environment often struggle with assuming this responsibility and face challenges when developing new ways of learning and finding suitable study methods **(Nuade et al., 2016)**.

According to Flavell, 1976, there are many facets to learning, including the actual cognitive processes of learning, plus planning, monitoring progress, evaluating comprehension, using appropriate studying strategies and reflecting on the efficacy of learning approaches. Awareness and monitoring of these cognitive and learning processes is called metacognition **(Jayne L. Dennis & Matthew P. Somerville, 2022)**. Metacognition is colloquially defined as thinking about one’s own thinking and more formally defined as the knowledge of cognition and strategies to regulate it **(Muijs & Bokhove, 2020)**. A metacognitive student is one who knows how to learn because they appreciate what they know, what they must do, and the merits of different approaches to acquiring and understanding new knowledge **(Wilson & Bai, 2010)**.

Literature reviews have identified variable and inconsistent definitions of metacognition for more than four decades. The term ‘metacognition’ is ascribed to

Flavell who originally defined it as ‘one’s knowledge concerning one’s own cognitive processes’ and ‘the active monitoring and consequent regulation and orchestration of [cognitive] processes. Flavell described metacognitive knowledge as ‘knowledge or beliefs about what factors or variables act and interact in what ways to affect the course and outcome of cognitive enterprises. Flavell further elaborated on three categories of factors within metacognitive knowledge: person, task and strategy **(Muijs & Bokhove, 2020)**.

Later, Jacobs and Paris 1987 described three different categories of metacognitive knowledge: declarative, procedural and conditional knowledge. Declarative knowledge describes what we know about our own cognition and the cognitive strategies available to us; procedural knowledge explains how to put those cognitive strategies into practice; and conditional knowledge is knowing when and why to use a particular strategy **(Pintrich et al., 2000)**.

Flavell’s metacognitive regulation, alternatively called metacognitive skills, some researchers e.g. Veenman et al., 2006 & Efklides, 2011, describe the control of cognition in relation to the objective of an activity as note the assumption that individuals construct goals for their cognitive endeavors. Regulation can occur before, during and after the activity and is typically labelled as planning, monitoring and evaluation. Metacognitive regulation is sometimes described as a skillset because it comprises active processes rather than knowledge possession **(Jiang et al., 2016).**

Supporting the development of metacognition is a powerful way to promote student success in college. Students with strong metacognitive skills are positioned to learn more and perform better than peers who are still developing their metacognition. Students with well-developed metacognition can identify concepts they do not understand and select appropriate strategies for learning those concepts. They know how to implement strategies they have selected and carry out their overall study plans. They can evaluate their strategies and adjust their plans based on outcomes. Metacognition allows students to be more expert-like in their thinking and more effective and efficient in their learning. While collaborating in small groups, students can also stimulate metacognition in one another, leading to improved outcomes **(J. D. Stanton *et al.* 2021).**

Self-directed learning means various types of individual and group activity of students that they have undertaken in the classroom and extracurricular activities at home without the direct participation of the teacher. Independent work is an obligatory part of the curriculum and an essential part of the learning process, the result of which is the development of subject knowledge and skills considered as an integral characteristic of readiness to meet the challenges **(Kovalenko &Smirnova, 2015).**

Self-learning readiness is defined as possession level of necessitated attitude, talent and personal features for self-learning. Learners who possess high readiness level for self-learning are conscious of their responsibility in learning and they act independently without any help of others. Also they are curious, willing and have self-confidence who organize their times effectively and have the talent to plan in order to finish their tasks and they are successful in solving problems **(Abd-El-Fattah, 2010, and Chou & Chen, 2012).**

Self-directed learning skills is defined as the ability to manage learning tasks without having them directed by others, ability to question inquire and problem solve, ability to keep an open mind to other points of view, ability to translate learning needs into learning goals, plans, and activities, ability to observe and model others' performance to improve, and ability to maintain continuous self - motivation. **(Weimer, 2010).**

Today, using is a highly complex and challenging profession that patient care the capacity to think critically is also an important component of higher education and more specifically of education Nurses need critical thinking to handle patients increasing cognitive ability and adapt to the changing nature of the healthcare system **(Achari Ismail 2014)**. Additionally, nursing educators are essential to instructional communication, thus having the ability to promote learners' beneficial critical thinking skills and abilities. It is important to know how students to think critically is well as how nursing educators can assist students attains the skills needed to achieve quality care for patients **(Adams, 2017).**

The nursing process is scientific problem solving model **(Fern, O'Donnell et al. 2010)** using the steps of assessment, nursing diagnosis or problem identification planning, implementation, and evaluation in step-by-step process to plan care for patients. Critical thinking in nursing has long been equated with the nursing process which confines critical thinking to a very linear, narrow, single-right solution problem-solving process **(Edwards, 2007).** Critical thinking can be defined as rational reflective thinking on what to do or believe **(Ennis, 2016)**. Additionally, critical thinking is the disciplined process of conceptualizing, applying, evaluating, analyzing, synthesizing and evaluating information gathered or produced by observation experience and reasoning **(Paul & Elder. 2017).**

Critical thinking is used to describe the use of cognitive skills or strategies that increase the probability of a desirable result outcome of thinking that is purposeful reasoned, and goal-directed the kind of thinking involved in formulating inferences, solving problems, calculating likelihoods, and making a decision when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task. While creativity involves not only cognitive processes, but also affective, social, cultural, and political reasoning **(Halpern, 2015).**

Modern society is becoming more complex, information is becoming available and changing more rapidly prompting user to constantly rethink, switch directions and change problem-solving strategies more. Thus, it is increasingly important to promote critical thinking during learning to help learners develop strategies to apply new knowledge to complex situations in their day-to-day activities **(Carbogim et al, 2016).** Critical thinking improves the connection between health care research and practice. Also, clinical reasoning and problem solving require the health professional to use a range of different approaches including narratives, critical thinking, the best research available, generic thinking, collaborative reasoning and creative thinking in consultation with the patient and often their family to make professional judgements and decisions on the most appropriate solutions for the patient **(Karwowski et al, 2020).**

Critical thinking is the ability to analyze facts, generate and organize ideas, defend opinions, make comparisons, draw inferences, evaluate arguments and solve problems (**Chance, 2014**). Moreover, critical thinking is defined as a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based **(Sacli & Demirhan, 2014).**

Critical thinking plays an important role in social change. Help in uncover bias and prejudice. Creates the willingness to change one point of view as the individual continue to examine and re-examine ideas that may seem obvious. Enables the individual to distinguish between fact and opinion, ask good questions, make detailed observations, uncover assumptions and define their terms, and make assertions based on sound logic and solid evidence. Ct is a path to freedom form half-truths, prejudice and deceptions **(Chaffee, 2010)**.

Significance of the study

Currently, nursing teaching is under pressure to meet academic standards by preparing well-equipped students to meet the demands of the market. Additionally, metacognitive skills are very important to students to feel more confident in themselves and their abilities. Furthermore, metacognition plays a central role in students' academic engagement, success, attitude toward class, and choice of new learning activities. Teaching of nursing students has been teacher-centered and subject-focused. Nursing educators would be expected to introduce a particular knowledge, skills, and procedures to their students which formed the basis of nursing practice. So, nursing education should shifted from a teacher-centered teaching to student-centered learning in an effort to promote nursing students self-directed learning readiness, critical thinking ability, autonomy, and professional identity.

In Egypt from the investigator's observation as an assistant lecturer in the faculty of nursing, the learning process in the faculty of nursing is passive and depended only on the educators. So, the nursing students always being in a passive role rather than in active role and also depend on conservation rather than understanding in all of the time. The ability of the professional nurse to become self-directed learner is one way of ensuring competencies in professional nursing practice, critical think and takes ownership of their lifelong learning.

So, this study aims to determine the effect of metacognitive skills training on self-directed learning readiness, critical thinking ability and academic achievements among nursing students at the faculty of nursing, Zgazig University.